Chem 112B Midterm 3

Instructor: Richmond Sarpong
April 27th 2017
8:10–9:30 am, 100 Lewis

You have **80 minutes** to complete this exam. Please write your answers clearly only on the pages indicated *and be as detailed as possible*. Nothing written outside the numbered pages will be graded. There should be 9 total pages in this exam.

Name:_____

UID:_____

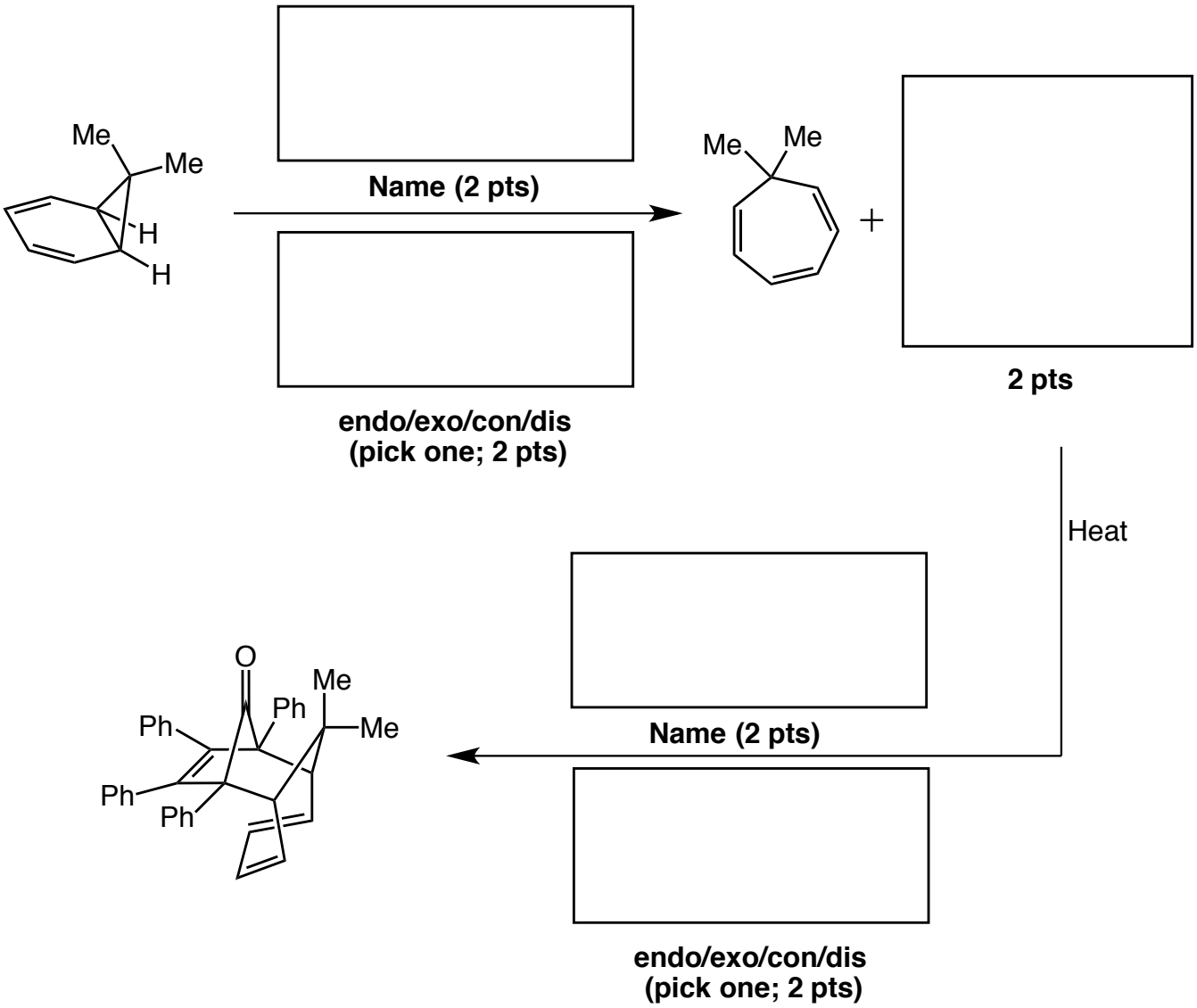
GSI Name:_____

Question	Score
1	_____ (10 points)
2	_____ (12 points)
3	_____ (15 points)
4	_____ (15 points)
5	_____ (16 points)
6	_____ (14 points)
7	_____ (18 points)

Total _____*(100)*

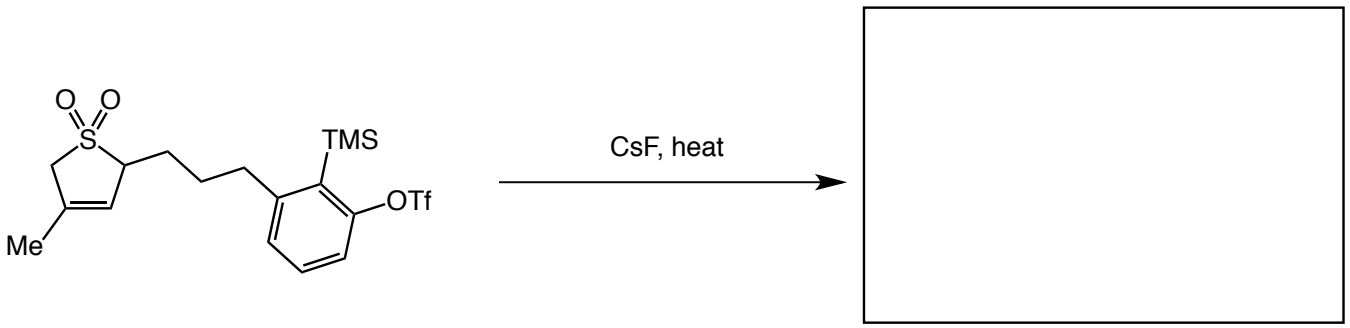
Question 1 (10 points):

Fill in the following boxes for the sequence of pericyclic processes that involve only the addition of heat. Be specific with the number of electrons (e.g., [m+n], [x,y], nπ) involved in each process



Question 2 (12 points):

Predict the product of the following reaction and show the mechanism for its formation knowing that it involves a cheletropic reaction. Indicate the cheletropic step in your mechanism and also show byproducts.

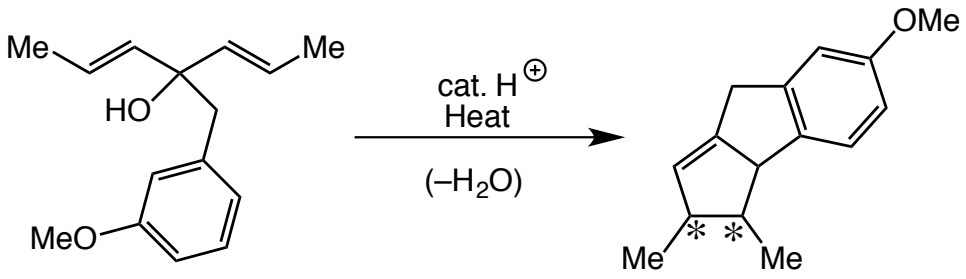


product (6 pts)

Mechanism (6 points):

Question 3 (15 points):

(a) Redraw the product shown below, indicating the stereochemistry at the asterisked positions for one enantiomer. This is a Nazarov cyclization/Friedel-Crafts alkylation sequence. (4 pts).

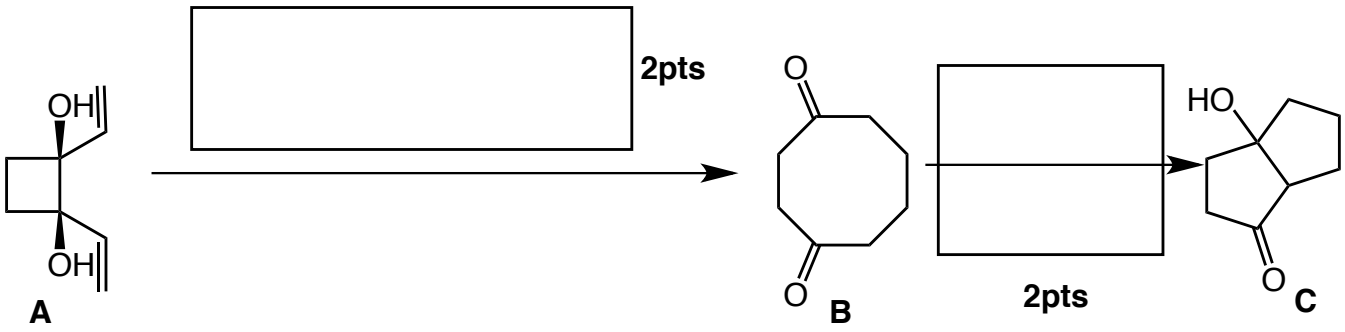


product with stereochem. (4 pts)

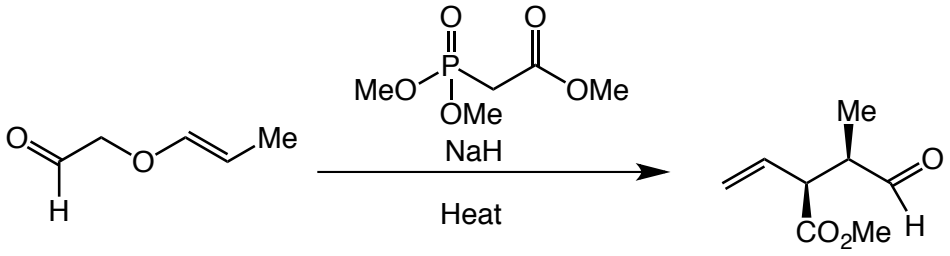
(b) Provide a rationalization for the stereochemistry you indicated in Part (a) using a drawing of the molecular orbital involved and up to 3 additional figures and 3 sentences (11 pts).

Question 4 (15 Points):

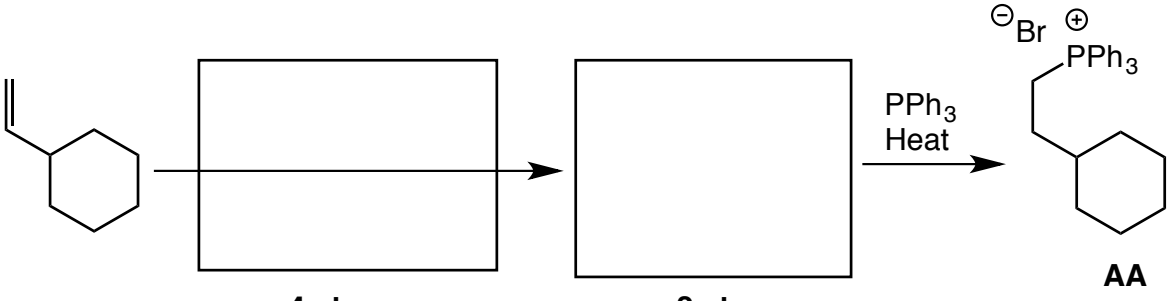
(a) Provide the **<u>names</u>** associated with the two transformations that convert **A** to **B** (upon heating) and then **B** to **C** in the boxes provided below (4 pts).



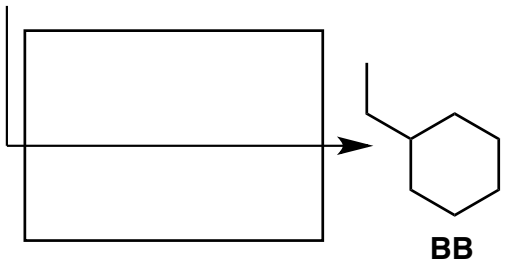
(b) Provide a mechanism for the transformation shown below and rationalize the stereochemical outcome given that the transformation involves a Horner-Wadsworth-Emmons (HWE) reaction (11 pts) (don't show the mechanism for the formation of the HWE product)



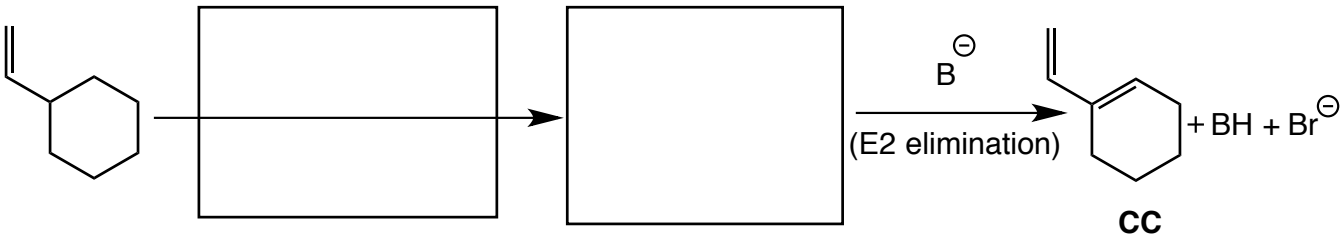
Question 5 (16 points):
Fill in the following boxes for the preparation of **AA**, **BB**, and **CC** that involve radical reactions.



4 pts **2 pts** **AA**



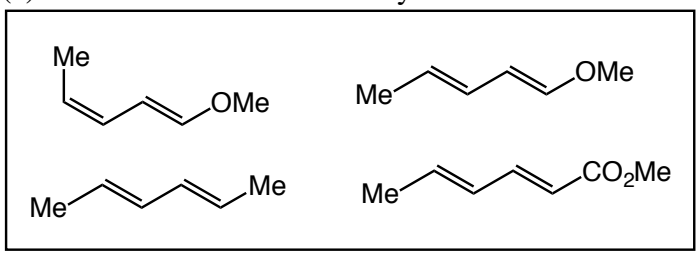
4 pts **BB**

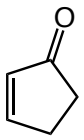


4 pts **2 pts** **CC**

Question 6 (14 pts)

(a) Circle the diene that is likely to react fastest with the dienophile that is shown below (2 pts).

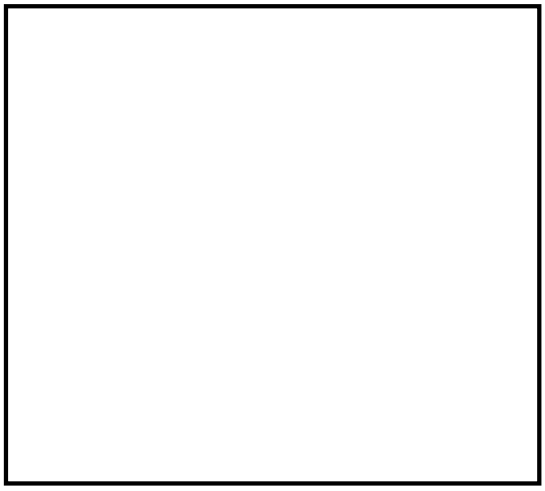




dienophile

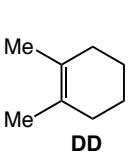
(b) Using no more than 4 figures and 4 sentences, provide a rationalization for your answer to Part (a) (4 pts)

(c) Show the kinetic product that is formed in Part 6(a) in the box below (2pts). Using no more than 4 sentences and 4 figures, provide a rationalization for the stereochemical and regiochemical outcome of your answer (6 pts).

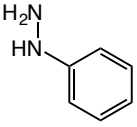


product with stereochem.
(2 pts)

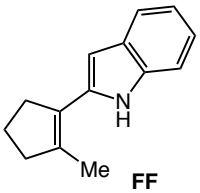
Question 7 (18 points):
Provide a synthesis of **FF** given **DD** and **EE** as starting materials. (Hint: a Fischer indolization is involved).



DD



EE



FF

The End